Sampling and Reconstruction of Visual Appearance: From Denoising to View Synthesis

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Applications
- Monte Carlo Rendering
- Light Transport Acquisition / Many Light Rendering
- Light Fields and Computational Photography
- View Synthesis
- Animation/Simulation (not covered in course)

Light Field Inside a Camera

Stanford Plenoptic Camera [Ng et al 2005]
- Contax medium format camera
- Kodak 16-megapixel sensor
- Adaptive Optics microlens array
- 125µ square-sided microlenses

4000 × 4000 pixels ÷ 292 × 292 lenses = 14 × 14 pixels per lens

Digital Refocusing [Ng et al 2005]
Scene from Above

Lenslet Array

[1908], [Adelson and Wang 1992], [Ng et al. 2005]

Integral Imaging

# Sensor Pixels X

# Sensor Pixels Y

Example

Sensor with 2000 x 1000 pixels

5 x 5 light field views,
each with 400 x 200 pixels

Integral Imaging: Spatio-Angular Resolution Tradeoff!

Light Field is Redundant!

out... and explore ways to overcome resolution tradeoff!